

Mounting and Operating Instructions

Solenoid Valves Type 3963



Fig. 1

General



Assembly, commissioning and operation of these devices may only be performed by experienced personnel. Proper shipping and appropriate storage are assumed.

The air supply may not exceed the maximum permissible pressure and, if necessary, it must be limited by a pressure reducer.

The devices can be mounted in any desired position. The filter in the enclosure cover and the cable gland Pg 13.5 must be installed hanging downwards, or if this is not possible, horizontally.

On mounting, it is important that a clearance of ≥ 300 mm above the enclosure cover is kept. If the device is mounted to a rotary actuator or linear actuator with positioner, it is necessary to change over the air supply to an external supply at connection 9 (see page 7 ff.).

The minimum permissible ambient temperature is -25°C (for Type 3963-....0/-....2 and 3756-1203/-6203) and -40°C (for Type 3963-....1/-....3 and 3756-1213/-6213/-3.../-8...).

The maximum permissible ambient temperature of $+80^{\circ}\text{C}$ is lowered for intrinsically safe devices in accordance with the Certificate of Conformity PTB No. Ex-90.C.2100 (see page 10).

Technical data, ordering data, spare parts and accessories see Data Sheet T 963 EN.

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Mounting

Mounting rails

► Type 3963-..14/-..27/-..28/-..54/-..64
These devices can be attached with two mounting bases for G-profile 32 according to EN 50035 or top hat rail 35 according to EN 50022 (Fig. 2).

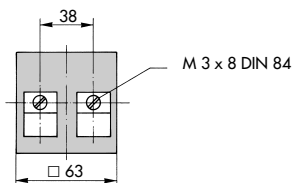
Wall mounting

► Type 3963-..14/-..27/-..28/-..54/-..64
These devices can be attached to a wall mounting plate (Fig. 2).

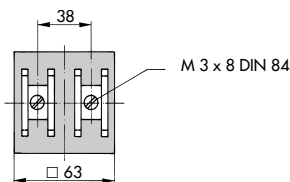
- Type 3963-..25, combined with
Type 3756-1203/-6203/-1213/-6213
- Type 3963-..76, combined with
Type 3756-3205/-8205/-3206/-8206/
-3325/-8325/-3335/-8335/
-3345/-8345/-3355/-8355

These devices can be attached with screws through bore holes (Fig. 3).

Mounting base for G-profile 32 (Order No. 1400-5930)



Mounting base for top hat rail 35 (Order No. 1400-5931)



Wall mounting plate (Order No. 1400-6726)

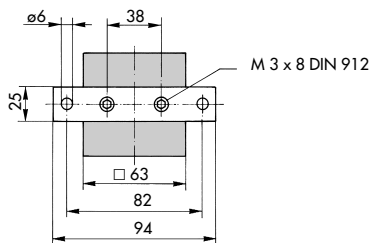


Fig. 2 · Dimensions in mm

Type 3963-..25, combined with Type 3756-1203/-6203/-1213/-6213

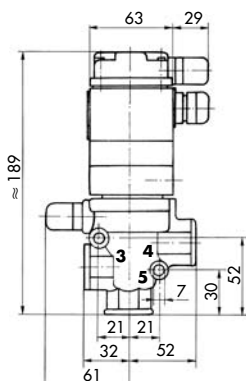
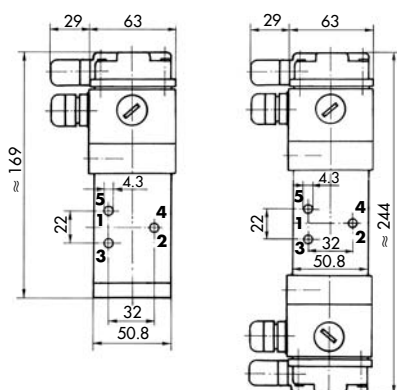


Fig. 3 · Dimensions in mm

Type 3963-..76, combined with Type 3756-3205/-8205/-3206/-8206/ -3325/-8325/-3335/-8335/ -3345/-8345/-3355/-8355



Mounting to rotary actuators with NAMUR interface according to VDI/VDE 3845

- ▶ Type 3963-..11/-..12/-..21/-..22/-..23/-..52/-..62
- ▶ Type 3963-..76, combined with
Type 3756-3207/-8207/-3208/-8208/
-3327/-3827/-3337/-3837/
-3347/-3847/-3357/-3857

These devices can be directly attached to rotary actuators with NAMUR interface (Fig. 4). Before mounting, check that the two O rings are positioned correctly. The operation direction is determined by a threaded coding pin M 5×10 DIN 916 on the mounting flange of the rotary actuator. The device is attached with two screws M 5×35 DIN 912. The mounting accessories are delivered together with the device.

Mounting to restrictor block for rotary actuators with NAMUR interface according to VDI/VDE 3845

- ▶ Type 3963-..76, combined with
Type 3756-3207/-8207/-3208/-8208

These devices can be attached to a restrictor block for rotary actuators with NAMUR interface (Fig. 5). The restricting function can be identified from the symbol indicated on the device. Different closing and opening times can be adjusted in a ratio of 1:15 by turning the restricting screws to the left or to the right respectively with a screw driver.

NAMUR interface according to VDI/VDE 3845

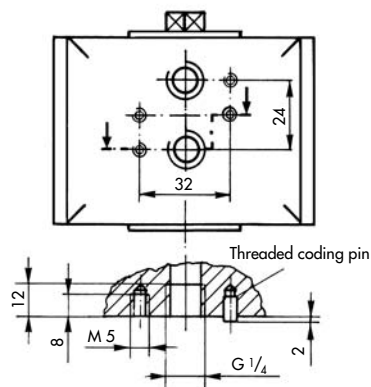
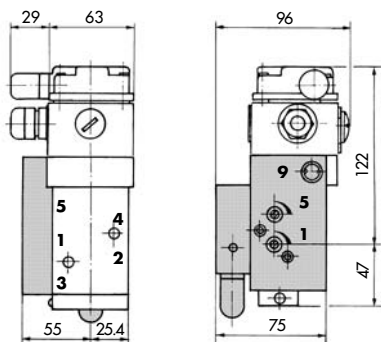


Fig. 4 · Dimensions in mm

Mounting to restrictor block for single-acting rotary actuators (Order No. 1400-6763)



Mounting to restrictor block for double-acting rotary actuators (Order No. 1400-6764)

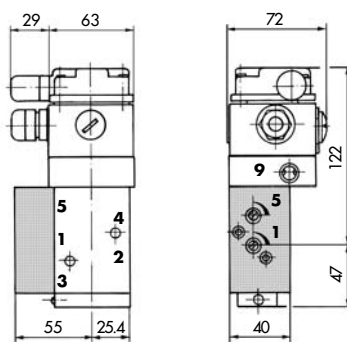


Fig. 5 · Dimensions in mm

Mounting to connection block for Linear Actuator SAMSON Type 3277

► Type 3963-..29/-..55

These devices can be mounted to connection block for Linear Actuator SAMSON Type 3277 with Positioner SAMSON Type 3766, 3767 or 3780 (Fig. 8). Before mounting, check that the four O-rings are positioned correctly on the mounting flange. The device is attached with two screws M 5×60 DIN 912. The mounting accessories are delivered together with the device. Mounting instructions for SAMSON devices see Mounting and Operating Instructions EB 8311 EN, EB 8355 EN and EB 8380 EN.

Mounting to linear actuators with NAMUR rib according to DIN IEC 534

► Type 3963-..53

This device can be directly mounted to a linear actuator with NAMUR rib. The device is attached with one screw M 8×45 DIN 912 which is delivered with the device.

Mounting to connection block for Linear Actuator SAMSON Type 3277

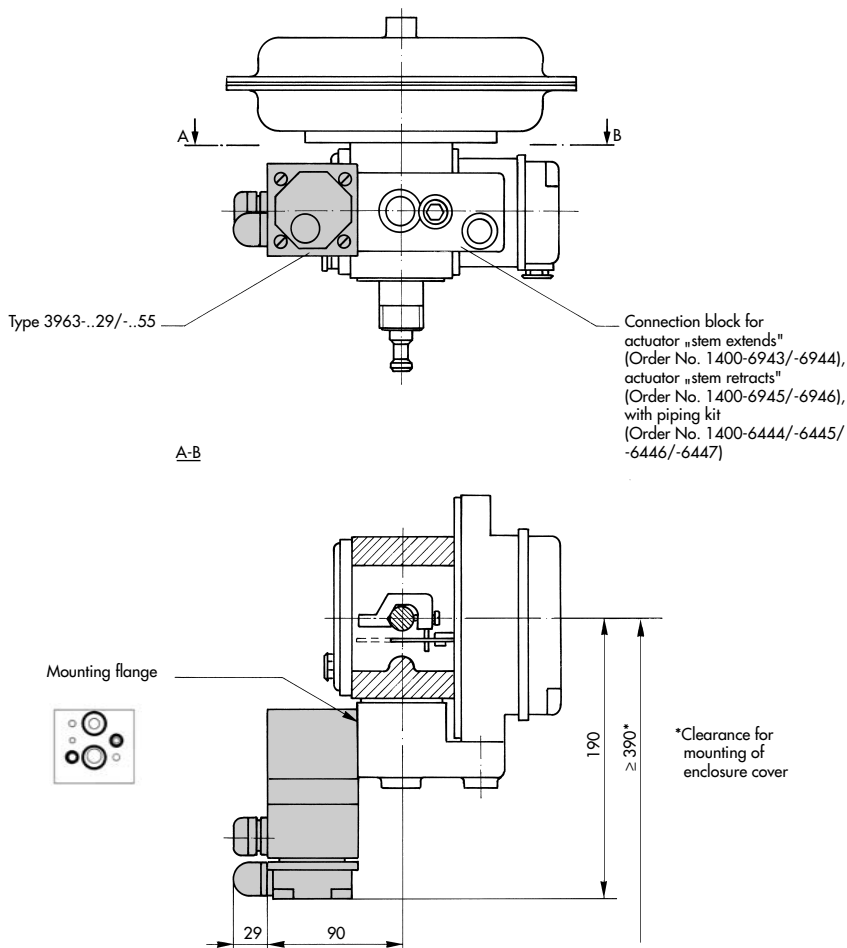


Fig. 8 · Dimensions in mm

Air connection



The air supply pipes and screw joints may only be laid and assembled by experienced personnel. They must be regularly checked for leaks and damage, and if necessary, repaired. Before starting any repair work, all supply pipes which are to be opened must be depressurized.

The air connections are G (NPT) $\frac{1}{4}$ or G (NPT) $\frac{1}{2}$ tapped holes depending on the version.

Note: The K_{vs} value of a pressure reducer connected upstream must be at least 1.6 times larger than the K_{vs} value of the device.

Supply pipe

Nominal size (Supply pipe length ≤ 2 m)				
Pressure (bar)	K_{vs} value			
	0.16 0.32	1.4	4.3	–
	Connection			
	4	1 and 3	4	9
≥ 1.4	$\geq \text{DN } 6$	$\geq \text{DN } 8$	$\geq \text{DN } 10$	$\geq \text{DN } 4$
≥ 2.5	$\geq \text{DN } 4$	$\geq \text{DN } 6$	$\geq \text{DN } 8$	
≥ 6		$\geq \text{DN } 4$	$\geq \text{DN } 6$	

Note: For supply pipes length ≥ 2 m larger nominal sizes must be provided.

► Type 3963-..25, combined with
Type 3756-1203/-6203/-1213/-6213

With the above listed devices, it is possible to check whether the nominal size of the supply pipe is sufficient as follows:

1. Unscrew the screw plug covering connection 9 and connect a pressure gauge.
2. The nominal size of the supply pipe proves to be sufficient when there is a pressure of ≥ 1.3 bar during the switching process.

Air supply instrument air 1.4 ... 6 bar			
Ambient temperature (°C)	Particle size (µm)	Dew point (°C)	Oily residues (mg/m³)
+15 ... +35	≤ 5	+10	≤ 0.1
–15		–20	
–32		–40	
–60		–70	

Working medium

Instrument air 1.4 ... 6 bar for internal air supply (as-delivered condition).

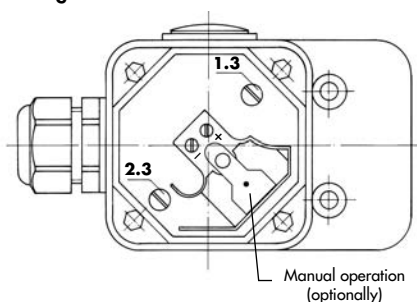
Instrument air, oil-containing air or non-aggressive gases of 0 ... 6 bar (10 bar with Type 3756) for external air supply across connection 9 (see page 7 ff.).

Exhaust air restrictors

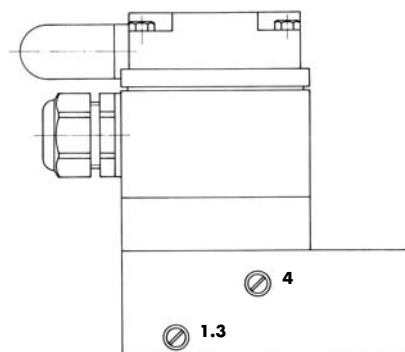
► Type 3963-..12/-..22/-..23/-..28/-..29

These devices have one or two exhaust air restrictors. The restricting function can be identified from the symbol indicated on the device. Different closing and opening times can be adjusted in a ratio of 1:15 by turning restricting screws to the right or to the left respectively with a screw driver. The restricting screws can be found underneath the enclosure cover or at the adapter plate (Fig. 9).

Setting of the exhaust air restrictors



Type 3963-..12/-..22/-..28/-..29



Type 3963-..23

Fig. 9

Conversion to external air supply across connection 9

- Type 3963-..25, combined with
Type 3756-1203/-6203/-1213/-6213

To these devices air supply in the as-delivered condition is to be connected internal via connection 4. Conversion to external air supply via connection 9 is effected as follows:

1. Remove pilot valve enclosure cover after removal of four filister head screws.
2. Remove pilot valve from booster valve after removal of three hexagon socket head screws.
3. Remove plate with flat gasket [1] after removal of a filister head screw (Fig. 10).
4. Turn flat gasket [1] by 90°. After assembly, the **tab** of the gasket [1] is **not visible from the outside**.
5. Conversion to external air supply is determined only by turning the flat gasket [1]. Prior to assembly, install flat gasket [3] between pilot valve and booster valve as follows (Fig. 12):

Type 3963 with index -01, -02, -04 and -06
The **white mark in the slots** of the flat gasket [3] is **not visible**.

Type 3963 with index -03, -05 and -10
The **tab** of the flat gasket [3] is placed in **cutout "Int"** of the enclosure.

- Type 3963-..76, combined with
Type 3756-3205/-8205/-3206/-8206/
-3207/-8207/-3208/-8208/
-3325/-8325/-3327/-8327/
-3335/-8335/-3337/-8337/
-3345/-8345/-3347/-8347/
-3355/-8355/-3357/-8357

To these devices air supply in the as-delivered condition is to be connected internal via connection 1 or 3. Conversion to external air supply via connection 9 is effected as follows:

1. Remove plate with flat gasket [2] from the connecting plate after removal of a filister head screw.
2. Turn flat gasket [2] by 180°. The **tab** of flat gasket [2] is then placed **in cutout "9" of the connecting plate** (Fig. 11).

Note: In the case of bilaterally actuated booster valves, both pilot valves must be converted.

Installation of flat gasket [1]



Fig. 10

Installation of flat gasket [2]

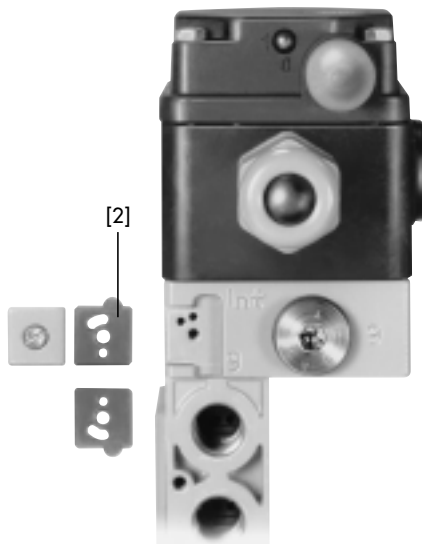


Fig. 11

► Type 3963-..14/-..52/-..53/-..54

To these devices air supply in the as-delivered condition is to be connected internal via connection 4. Conversion to external air supply via connection 9 is effected as follows:

1. Remove enclosure cover after removal of four filister head screws.
2. Remove solenoid valve from adapter plate after removal of three hexagon socket head screws.

Type 3963 with index -01, -02, -04 and -06

3. Turn flat gasket [3] by 180°. The **white mark** is then **visible in the slots** (Fig. 12).

Type 3963 with index -03, -05 and -10

Turn flat gasket [3] by 180°. The **tab** of the flat gasket [3] is then placed **in cutout "9"** of the enclosure (Fig. 12).

► Type 3963-..11/-..12/-..21/-..22/-..27/
-..28/-..29/-..55/-..62

To these devices the air supply cannot be changed. The flat gasket [3], if provided, must be installed in accordance with the as-delivered condition (Fig. 12).

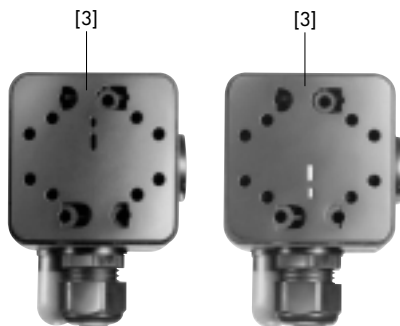
Exhaust air return

► Type 3963-..76, combined with
Type 3756-3206/-8206

To these devices, in the as-delivered condition connection 4 is closed with a threaded plug. If the exhaust air return is used for spring-loaded actuators, the threaded plug must be removed and connection 4 must be connected to the spring chamber of the actuator by a hose with nominal size DN 4 to 10 (depending on the actuator size).

Installation of flat gasket [3]

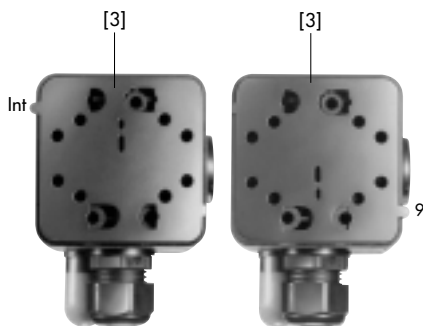
Type 3963 with index -01, -02, -04 and -06



Internal air supply
via connection 4
(as-delivered condition)

External air supply
via connection 9

Type 3963 with index -03, -05 and -10



Internal air supply
via connection 4
(as-delivered condition)

External air supply
via connection 9

Fig. 12

Electrical connection



As far as the electrical installation of the device is concerned, the relevant VDE regulations and the accident prevention regulations of the employers' liability insurance association must be observed.

For installation in hazardous areas, the respective national regulations of the country in which the device is to be used must be observed. In Germany this is VDE 0165.

When connected to DC voltage signals, correct polarity must be ensured.

For connection of intrinsically safe circuits, the Certificate of Conformity PTB No. Ex-90.C.2100 applies (see page 10).

The coated screws in the enclosure may not be tampered with.

The power supply is connected, depending on version, either through a cable gland Pg 13.5 to the terminals in the enclosure, with a Harting connector, a socket in accordance to DIN 43 650 or a cable socket M 12×1 (Fig. 13).

Cable

It is recommended that connecting cables with a conductor cross-section of $\geq 0.5 \text{ mm}^2$ are used. Connecting cables with an external diameter of 6 ... 12 mm are suitable for the cable gland Pg 13.5.

Degree of protection

The devices can be changed from degree of protection IP 54 (Order No. 8504-0066) to degree of protection IP 65 (Order No. 1099-1103) by exchanging the filter in the enclosure cover.

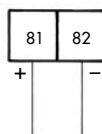
Manual operation

The devices have a manual operation as an alternative to allow the device to be manually operated when a nominal signal is not available:

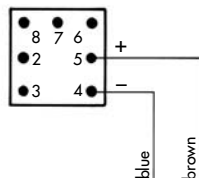
- Switch outside of the enclosure
- Push button outside of the enclosure
- Switch in the enclosure cover
- Pushbutton underneath enclosure cover (see page 6, fig. 9)

Note: For **safety circuits**, only devices **without manual operation** should be used.

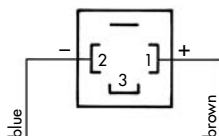
Connection diagrams



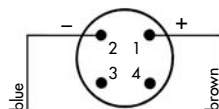
Terminals in the enclosure



Harting connector



Socket in accordance to DIN 43 650



Cable socket M 12×1

Fig. 13

Certificate of Conformity PTB No. Ex-90.C.2100 (Extract)

for the electric apparatus Solenoid Valve Type 3963-1... index -02 and -03

Class EEx ia IIC T6

dated 06.09.1990

1. Addendum dated 28.06.1991
2. Addendum dated 11.04.1994
3. Addendum dated 10.10.1995

The following table shows the maximum permissible ambient temperature within the temperature classes:

Nominal signal	Type	Permissible maximum ambient temperature		
		T 6	T 5	T 4
6 V	3963-11	+60 °C	+70 °C	+80 °C
12 V	3963-12			
24 V	3963-13			
22 mA	3963-14			
7.5 V	3963-17	+65 °C	+80 °C	

Note: Minimum permissible ambient temperature -45°C . This is limited to -25°C (for Type 3963-1...0/-1...2) and -40°C (for Type 3963-1...1/-1...3) due to the materials used.

To connect to a certified intrinsically safe electric circuit, refer to the maximum permissible values for voltage U_0 , current I_k and power P in the following table:

Type	3963-11		3963-12		3963-13			3963-14		3963-17	
U_0 (V)	13	27	25	28	32	32	28	8	15	28	32
I_k (mA)	150	125	150	115	70	90	115	150	200	115	90
P (mW)	*)	400	*)	400	*)	250	*)	*)	400	*)	350

*) No power limit

Note: Internal capacitance and internal inductance are negligible.

Certificate of Conformity PTB No. Ex-90.C.2100 (Extract)

for the electric apparatus Solenoid Valve Type 3963-1... index -04 and up

Class EEx ia IIC

4. Addendum dated 11.07.1997

The following table shows the maximum permissible ambient temperature within the temperature classes:

Temperature class		T6	T5	T4
Ambient temperature	maximum	+60 °C	+70 °C	+80 °C
	minimum	-45 °C *)		

*) Limited to -25 °C (for Type 3963-1...0/-1...2) and -40 °C (for Type 3963-1...1/-1...3) due to the materials used.

To connect to a certified intrinsically safe circuit, refer to the maximum permissible values for voltage U_0 , current I_0 and power P in the following table:

U_0 (V)	25 V	27 V	28 V	30 V	32 V
I_0 (mA)	150 mA	125 mA	115 mA	100 mA	90 mA
P	no power limit				

Note: Internal capacitance and internal inductance are negligible.

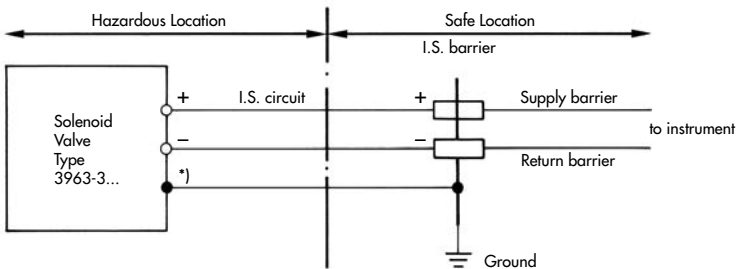
Installation Directions for Devices for Use in Hazardous Locations in Compliance with CSA Approval

The devices may be installed in intrinsically safe circuits when connected with CSA approved intrinsically safe barriers (Fig. 14). In case of doubt as regards barrier selection, contact the manufacturer. For maximum values of V_{max} , R_{min} and I_{max} of the various devices see the following table:

Type	V_{max} [V DC]	R_{min} [Ω]	I_{max} [mA]
3963-31	13	94	150
3963-32	25	168	150
3963-33	28	256	110
3963-34	9	60	150
3963-37	28	256	110

Connection diagrams

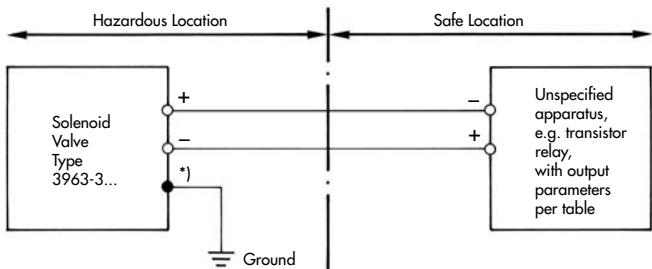
CSA certified for Hazardous Locations: Class I; Division 1; Groups A, B, C, D



*) Only for metal enclosure

Cable entry Pg 13,5 or metal conduit according to assembly drawing No. 3963-3... and drawing No. 1150-6016 T-3

CSA certified for Hazardous Locations: Class I; Division 2; Groups A, B, C, D



*) Only for metal enclosure

Cable entry only rigid metal conduit according to drawing No. 1150-6016 T-3

Fig. 14

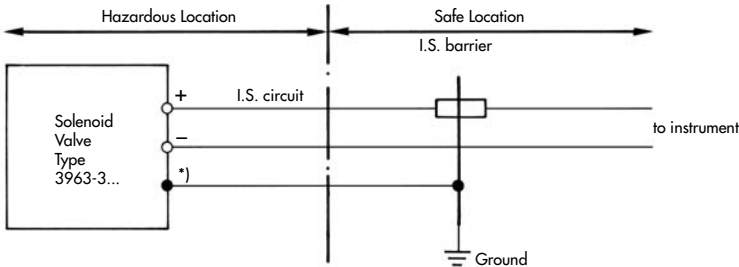
Installation Directions for Devices for Use in Hazardous Locations in Compliance with FM Approval

The devices may be installed in intrinsically safe circuits when connected with FM approved intrinsically safe barriers (Fig. 15). In case of doubt as regards barrier selection, contact the manufacturer. For maximum values of V_{max} and I_{max} of the various devices see the following table:

Type	V_{max} [V DC]	I_{max} [mA]
3963-31	13	150
3963-32	25	150
3963-33	28	110
3963-34	9	150
3963-37	28	110

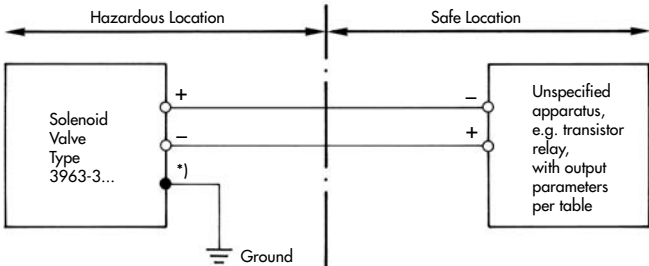
Connection diagrams

FM certified for Hazardous Locations: Class I, II, III; Division 2; Groups A, B, C, D, E, F, G



*) Only for metal enclosure

FM certified for Hazardous Locations: Class I, II, III; Division 1; Groups A, B, C, D, E, F, G



*) Only for metal enclosure

Fig. 15

(Specifications subject to change without notice)

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